SPECTROSCOPIA MOLECULAR

Un bulletin mensual de novas e informationes de interesse e valor al spectroscopistas molecular

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IO ES CONTRA grossitate e grandor in omne lor formas, e pro le fortias moral invisibile e molecular que labora ab individuo a individuo, insinuante se per le fissuras del mundo como un rete de molle radicellas... e findente, nonobstante, le plus dur monumentos del orgolio del homines -- si on da a illos le tempore.

-- WILLIAM JAMES.

N O V E D I S V E L O P P A M E N T O S

**SPECTROS INFRARUBIE PRECISE. Le longitudes de undas de lineas spectral infrarubie pote esser determinate con un error de 1 parte in 500.000. Proxime a 5 µ le error es 0,1 Å. Isto per le uso del bandas de interferentia ex un interferometro Fabry-Perot como un spectro de comparation. Le maximos del bandas de interferentia es traducite in numeros de undas per le superposition de lineas atomic standard. Mesurate es le lineas de Hg, Kr, Xe, e le banda fundamental de CO. Istos provide un gruppo de longitudes de undas standard pro le infrarubio. (E. K. Plyler, Science 121, 625 (1955); Bureau National de Standards, Washington 25, D. C., S. U.)

* * *

**ANALYSE INFRARUBIE CONTINUE. Al nove fabrica petrochimic (costo $50.000.000) del compania American Cyanamid a Fortier, La., le functionamento efficace depende criticamente del uso de continue analyse infrarubie. Usate es 11 tal analysatores, primarimente in le controlo del production del acetyleno e ammoniaco le quales es usate in le fabrication de acrylonitrilo. Le analysatores infrarubie Perkin-Elmer, cata un del quales costa inter $2800 e $5450, pote mesurar concentrationes de minus que 1 parte per million.

Es expectate que in le futuro le analysatores va esser connectite a computatores que calculara e inviara instructiones al valvulas e al apparatos de controlo que governa le processo.

Detalios additional in Chem. Eng. News 33, 1903 (1955).

* * *

**SPECTROMETRO UNIVERSAL. Le spectrometro de modello 21 de Perkin-Elmer normalmente es usate in le region infrarubie 2-37 µ. Nonobstante, con le addition del appropriate emissores de energia, prismas, e detectores, le uso del instrumento pote esser extendite al ultraviolette, al visibile, e al infrarubio proxime. Le conversion ab region a region es simple e rapide. Le conversion ab ultraviolette al visibile o infrarubio proxime require solmente alicun secundas; illo al infrarubio normal, proxime a 30 minutas. (V. COATES, T. MILLER, e A. SAVITZKY, Applied, Spectroscopy 9, No. 1, 14-19 (1955); Corporation Perkin-Elmer, Norwalk, Conn., Statos Unite.)

* * *

**ACIDO FORMIC. Le spectro microundic de 5 isotopos de HCOOH ha essite studiate e plure transitiones rotational ha essite identificate e mesurate. Le parametros structural es

C-H	1,085 Å	C=O	1,245 Å
C-O	1,312 Å	O-H	0,95 Å
O-O	2,261 Å	O-C-O	124°18'
C-O-H	107°48'	H-C-O	117°51'

Le numero de undas correspondente al frequentia torsional del gruppo O-H circa le ligamine C-O es 667 K. Isto es in bon concordantia con le valor 658 K obtenite per L. Bonner e R. Hofstadter (J. Chem. Phys. 6, 531 (1938)) ex le datos infrarubie. Le grande potential que restringe le torsion, tanto como le parvitate del ligamine inter C e O-H, pare indicar que iste ligamine ha un amonta inusualmente grande del character del duple ligamine. (R. G. LERNER, J. P. FRIEND, e B. P. DAILEY, J. Chem. Phys. 23, 210 (1955); Universitate Columbia, New York 27, N. Y., S. U.)

* * *

**INTEGRALES COULOMBIC. Tabulas de integrales Coulombic a duo centros inter le orbitales 1s, 2s, e 2p ha essite preparate. (C. C. J. ROOTHAAN, Reporto Technic Special, 1955; Universitate Chicago, Chicago 37, Ill., S. U.)

* * *

**PARAFFINES NORMAL. Spectros infrarubie de un serie de n-paraffines crystallin, le quales contine un numero impare de atomos de carbon, ha essite obtenite. Regularitates in le presente e previe datos infrarubie, tanto como in le spectros Raman, es interpretate in terminos del vibrationes de tension de CH_2, CH_3, e C-C. (J. K. BROWN, N. SHEPPARD, e DELIA M. SIMPSON, Phil. Trans. Roy. Soc. London 247, 35-58 (1954); Universitate Cambridge, Cambridge, Anglaterra.

SPECTROS MOLECULAR. III.
TRACTAMENTOS DEL COORDINATAS NORMAL DE MOLECULAS POLYATOMIC
B. APPLICATIONES SPECIFIC

Forrest F. Cleveland, Arnold G. Meister, e Fred L. Voelz
Instituto Technologic de Illinois, Chicago 16, Illinois
(continuate ab Spec. Mol. 4, 38 (1955) - Parcella No. 5)

3. IE MOLECULA O_3

OZONO etiam es un molecula del typo XY_2 con $d = 1{,}2775$ Å e $\alpha = 116{,}75°$.[13] Le numeros de undas que corresponde al frequentias fundamental es

$$\sigma_1(a_1) = 1110, \quad \sigma_2(a_1) = 705,$$
$$\text{e } \sigma_3(b_1) = 1043 \text{ K.}^{14,15}$$

[13] R. H. Hughes, Bull. Am. Phys. Soc. 26, 21, No. 6 (1951).

[14] M. K. Wilson e R. M. Badger, J.Chem. Phys. 16, 741 (1948); R. M. Badger e M. K. Wilson, J. Chem. Phys. 18, 998 (1950).

[15] M. J. Klein, F. F. Cleveland, e A. G. Meister, J. Chem. Phys. 19, 1068 (1951).

Le expression pro le energia potential es le mesme como illo date in Eq. 2B2, e le matrices F e G es date in sectiones 2B e 2C. Le equationes secular in forma expandite es date in Eqs. 2D1 e 2D4, e per Eq. 2D2 on obtene le λ's ex le σ's.

Assi, on pote obtener le constantes del energia potential como explicate in section 2. Le difficultate es que on ha 4 f's e solmente 3 σ's. Per consequente il non es possibile obtener un gruppo unic del f's, sed solmente plure gruppos del f's pro plure valores assumite de f_{dd}/f_d.

Valores calculate de iste maniera es date in Tabula 3-1.[16] Si f_{dd}/f_d es minus que -0,04 o plus grande que 0,38, valores imaginari de f_α' e $f_{d\alpha}'$ es ob-

[16] F. F. Cleveland e M. J. Klein, J. Chem. Phys. 20, 337 (1952).

TABULA 3-1. Constantes del energia potential pro ozono (O_3).

f_{dd}/f_d	f_d	f_α'	f_{dd}	$f_{d\alpha}'$
-0,04	4,02	2,50	-0,161	0,541
0,00	4,19	2,20	0,000	0,275
0,05	4,41	1,97	0,220	0,146
0,10	4,65	1,78	0,465	0,093
0,15	4,92	1,60	0,739	0,095
0,20	5,23	1,45	1,05	0,153
0,25	5,58	1,32	1,40	0,278
0,30	5,98	1,23	1,79	0,498
0,38	6,75	1,37	2,57	1,36

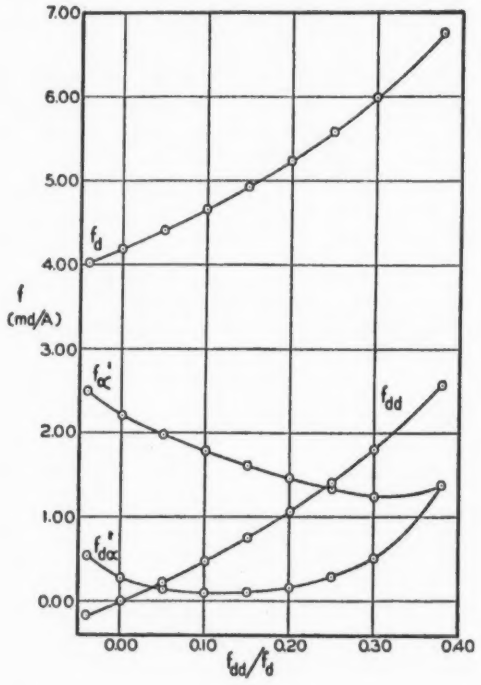

Fig. 3-1. Constantes del energia potential de ozono (O_3).

tenite ($f_\alpha' = f_\alpha/d^2$, $f_{d\alpha}' = f_{d\alpha}/d$). Le unitates del f's es md/Å.

Le resultatos de Tabula 3-1 es monstrate graphicamente in Fig. 3-1. Le valores de f_α' e $f_{d\alpha}'$ obtenite ex le 2nde radice del equation quadratic pareva irrationalmente grande e per consequente non esseva includite in Tabula 3-1.

Le valores pro $f_{dd}/d_d = 0{,}15$ sia adoptate proque istos pare rationabile in comparation con le resultatos pro altere moleculas. Istos es

$$f_d = 4{,}92, \qquad f_\alpha' = 1{,}60,$$

$$f_{dd} = 0{,}739, \qquad f_{d\alpha}' = 0{,}095 \text{ md/Å}.$$

Nonobstante, iste selection es alique arbitrari proque un gruppo unic del f's non pote esser determinate sin datos pro un molecula isotope.

(Va continuar in un numero futur)

NOVAS

DR. P. G. PURANIK, Associate Professor de Physica al Universitate Osmania a Hyderabad in India, ha retornate a India via London. In Anglaterra, ille visitava Dr. H. W. Thompson al Universitate Oxford e Dr. W. C. Price al King's College in London. Dr. Puranik ha essite depost septembre 1954 un membro del laboratorio de spectroscopia al Instituto Technologic de Illinois in Chicago.

* * *

DR. DELIA M. SIMPSON, Departimento de Chimia Physic al Universitate Cambridge in Anglaterra, ha devenite Seniora J. N. Agar.

* * *

LE COBIENTZ SOCIETY teneva su prime convention le 16 de junio al tempore del Symposio Annual Ohio State in Columbus, Ohio, Statos Unite. Isto es un societate pro servir le spectroscopistas infrarubie.

* * *

SECUNDO DR. MARSHALL V. OTIS, Chef del Section 2 - Datos Infrarubie, Subcommittee super Datos Standard del American Society for Testing Materials (1916 Race St., Philadelphia 3, Penn., S. U.)

-- Vide NOVAS, p. 48, col. 2 --

NOVE LIBROS

Atomic and Nuclear Physics (Physica Atomic e Nucleari). ROBERT. S.SHANKLAND The Macmillan Company, 60 5th Ave., New York 11, N. Y., Statos Unite, 1955. 529 + xv paginas, $7.50.

ISTO ES UN BEN-SCRIBITE tractamento elementari del physica nucleari, atomic e molecular. Discutite es le atomo e le theoria cinetic, le electron, structuras e spectros atomic e molecular, radios X, le stato solide del materia, isotopos e structura nucleari, radioactivitate natural, transformationes nucleari inducite, origines de energia nucleari, processos de alte energias nucleari, e radios cosmic.

Naturalmente, con un si grande numero de themas, il non esseva possibile includer multe detalios in re cata un. Nonobstante, isto es un libro excellente pro introducer le lector a iste campo. Illo es bellemente imprimite e le illustrationes es extraordinarimente bon.

* * *

Reports on Progress in Physics (Reportos super le Progresso in Physica). The Physical Society, 1 Lowther Gardens, Prince Consort Road, London, S. W., Anglaterra. Vol. XVII, 1954. 280 paginas, precio £2 10s., posta 1s., 6d.

CONTINITE ES: 1) Structura del scalia nucleari - M. H. L. PRYCE.

2) Theoria diffractionic - C. J. BOUWKAMP.

3) Electricitate atmospheric - J. ALAN CHALMERS.

4) Le condition physic del corona solar - C. W. ALLEN.

5) Theoria del origine del radios cosmic - EDWARD TELLER.

6) Statos de valentia atomic e le ligar chimic - W. MOFFITT.

7) Antiferromagnetismo - A. B. LIDIARD.

8) Movimentos horizontal in le ionosphera - B. H. BRIGGS e M. SPENCER.

SUMMARIOS DE ARTICULOS FUTUR

Calculation del Factores de Dispolarisation del Lineas Raman de Moleculas CCl_3X. ALFONS WEBER E SALVADOR M. FERIGLE. Instituto Technologic de Illinois, Chicago 16. Submittite al J. Chem. Phys. le 9 de martio 1955.

LE FACTORES DE DISPOLARISATION del vibrationes totalmente symmetric de 3 moleculas CCl_3X (X = H, D, o Br) esseva computate usante expressiones previemente derivate pro le tracia e anisotropia del tensor de polarisabilitate. Le tractamentos del coordinatas normal associate esseva facite per le methodo del matrices F e G de Wilson, con un function del energia potential quadratic e general.

Le valores calculate e observate concorda ben pro le modos de tension, sed non pro illos de flexion. Le resultatos es:

Molecula	σ	ρ_c	ρ_o
	3017,2 K	0,25	0,24
CCl_3H	668,2	0,06	0,082
	371,2	0,48	0,19
	2258,9	0,27	
CCl_3D	641,1	0,12	
	368,1	0,52	
	716,3	0,81	
CCl_3Br	422,2	0,005	
	247,3	0,71	

Hic σ = numero de undas, c = calculate, o = observate, e K = kaysers o cm^{-1}. Le valores observate es ex le resultatos photoelectric de D. H. Rank, J. Opt. Soc. Am. 37, 798 (1947).

Ethanos Substituite. IV. Le Isomeros Rotational de 1,1,2,2-Tetrachloroethano; Assignationes del Vibrationes Normal. J. P. ZIETLOW, F. F. CLEVELAND, e A. G. MEISTER. Instituto Technologic de Illinois, Chicago 16. Submittite al J. Chem. Phys. le 29 de martio 1955.

LE NUMEROS DE UNDAS del vibrationes normal de trans-Cl_2HC-$CHCl_2$, e alicunes del fundamentales del molecula deuterate, esseva calculate per le methodo del matrices F e G de Wilson. De plus, le spectro infrarubie esseva obtenite ab 530 a 4000 K. Assignationes complete de omne le observate bandas Raman e infrarubie esseva facite, e alicun fundamentales inobservate esseva computate.

SUMMARIOS DE ARTICULOS RECENTE

Intensitates Vibrational. IV. Momentos Ligaminic in C_2F_4. DALE G. WILLIAMS, WILLIS B. PERSON, e BRYCE L. CRAWFORD, J. Chem. Phys. 23, 179(1955). Universitate Minnesota, Minneapolis, Minn., Statos Unite.

MELIORATIONES IN LE spectrometros infrarubie, insimul con avantiamentos importante in le designo[1] e technica[2] del experimentos spectrophotometric, ha facite possibile le studio del intensitates del absorption infrarubie de simple moleculas. Isto da informationes in re le cambiamento del momento dipolic del molecula con le motion vibrational e le structura molecular, sin approximationes additional.[3] Nonobstante, iste intensitates es frequentemente interpretate in terminos de "momentos ligaminic" independente e hypothetic que es associate con cata un del ligamines heteronucleari del molecula.

Iste concepto ha nondum essite completemente probate, sed le datos disponibile indica que le momentos ligaminic μ, e le cargas ligaminic effective $\xi = d\mu/dr$, se cambia considerabilemente non solo ab molecula a molecula, sed etiam intra un date molecula.[4]

---

[1] E. B. Wilson, Jr., e A. J. Wells, J. Chem. Phys. 14, 578 (1946).

[2] S. S. Penner e D. Weber, J. Chem. Phys. 19, 807 (1951).

[3] B. L. Crawford, Jr., e H. L. Dinsmore, J. Chem. Phys. 18, 983 (1950); D. F. Eggers, Jr., e B. L. Crawford, Jr., ibid. 19, 1554 (1951).

[4] Vide, pro exemplo, le datos super le

ARTICULOS RECENTE, continuate . . .

momentos ligaminic C-H, e le cargas effective, date per (a) Thorndike, Wells, e Wilson, J. Chem. Phys. 15, 157 (1947) e (b) A. Thorndike, J. Chem. Phys. 15, 868 (1947).

Pro examinar le limitationes de iste approximation, on ha necessitate de intensitates experimental precise pro un numero de moleculas que contine un date ligamine -- tal como C-H o C-F -- in plure locationes, preferibilemente libere de polarisation, conjugation, o altere effectos complicante.

Iste articulo da datos pro le ligamine C-F in F_3C-CF_3. Iste molecula ha 4 fundamentales que es facile a mesurar. Le intensitates de istos duce a 2 gruppos independente de valores de μ e . Le 2 valores de μ, tanto como le 2 valores de ε, debe concordar se, si le hypothese de momentos ligaminic es valide. Un altere test (plus rigide) es que le valores μ pro C_2F_6 debe concordar se con illos de CH_3F[5] e CF_4[6].

---

[5] G. Barrow e D. McKean, Proc. Roy. Soc. (London) A213, 27 (1952).

[6] P. Schatz e D. Hornig, J. Chem. Phys. 21, 1516 (1953).

Le valores obtenite in iste investigation pro C_2F_6 e illos obtenite in le previe investigationes pro CH_3F e CF_4 es comparate infra:

	ε	μ
CH_3F	4,70 o 4,50	1,9 o 3,1
CF_4	4,88 o 3,35	1,12 o 2,36
C_2F_6	2,25 2,40 D/Å	1,49 1,07 D

(par. = parallel, per. = perpendicular, D = Debyes, e Å = angstrom.)

Il ha 2 conclusiones:

1) Le magnitude del momento ligaminic C-F accresce quando le longitude del ligamine accresce.

2) Le concepto de momento ligaminic es usabile solmente como un approximation del prime ordine de magnitude. Le parametros del momentos ligaminic debe esser "rationabile" in magnitude, sed non pote esser transferite ab un molecula a un altere in alicun senso quantitative.

NOVAS, cont. ab p. 46, col. 2 . . .

un necessitate urgente existe pro le spectros de absorption de compositos que ha proprietates carcinogenic. Un lista de tal compositos (primarimente anulos condensate) pote esser obtenite ab Dr. Otis. Si vos ha tal datos, per favor submitte los a Dr. Otis pro publication per le Committee super Datos Spectral del Consilio National de Recerca al statounitese Bureau National de Standards.

* * *

RESEARCH FOR INDUSTRY publicava su numero de martio 1955 (Vol. VII, No. 5) completemente in Interlingua. Isto es un publication del Stanford Research Institute a Stanford in California. Statos Unite, del qual Dr. J. E. Hobson es le chef. Continite es un articulo interessante in re le energia del sol. Exemplares es disponibile.

* * *

NOVAS DE INTERCAMBIO MUNDIAL, un nove periodico, ha facite su début (No. 1, April 1955). Exemplares de isto pote esser obtenite ab Sr. Kirtland Harsh, Redactor-Editor, 103 Del Ray Ave., Chattanooga, Tenn., Statos Unite.

* * *

Al 10me SYMPOSIO OHIO STATE super spectroscopia e structura molecular, 117 discursos esseva presentate. Themas e numeros de istos esseva:

Spectros de bandas electronic.....	26
Spectros a frequentias radionic...	8
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REVISTAS

Determination de Massas Atomic per le Spectroscopia Microundic. S. GESCHWIND, G. R. GUNTHER-MOHR, e C. H. TOWNES, Revs. Modern Phys. 444-455 (1954). Universitate Columbia, New York, N. Y.

LE SPECTROSCOPIA MICROUNDIC da informationes in re le massas atomic ex le cambiamento isotope in le spectro rotational de moleculas.

Per exemplo, le cambiamento in ICl es 5 pro cento, le qual corresponde a un cambiamento in le frequentia de 1000 Mc/sec. Frequentias e intervallos de frequentia proxime a 24000 Mc/sec pote esser mesurate con un error non plus grande que 0,01 Mc/sec. Per consequente, iste cambiamento de 1000 Mc/sec pro un cambiamento de 2 unitates de massa pote esser mesurate a 1 parte in 10^5. Isto significa que le massa de Cl^{37} pote esser determinate a $5 \cdot 10^{-5}$ de un unitate de massa.

In certe casos, le precision del determination de massa per le methodos microundic es tanto bon o melior que illo obtenite per methodos plus ben cognoscite. In altere casos, illo es inferior per un parve factor.

Ben que le precision del mesurationes per le spectrometria massic es frequentemente multo alte, deviationes inter le varie mesurationes es frequentemente plus grande que le errores de precision. Isto indica errores systematic.

Le determinationes microundic ha nondum essite extendite al puncto ubi errores systematic -- tal como un cognoscentia insufficientemente complete del structura molecular electronic -- es usualmente de importantia. Nonobstante, le disveloppamento continue del methodos microundic debe permitter meliorationes considerabile in le precision de istos. Isto debe dar plus bon determinationes de massa in casos ubi le incertitudes systematic, del varie typos discutite supra, non es nimis grande.

Le theoria, methodos, e resultatos experimental es discutite.

* * *

Spectroscopia Microundic de Gases. J. SHERIDAN, Research 8, 88-93 (1955). Le Universitate, Birmingham, Anglaterra.

LE SPECTROS DE GASES nunc pote esser mesurate, con le alte resolution obtenibile per le technicas de radio, a longitudes de undas de minus que 1 mm. Un grande varietate de informationes ha essite obtenite in re le distantias internucleari, structuras electronic, proprietates molecular e nucleari, e processos de collision inter moleculas. Iste articulo sublinea alicunes del recente disveloppamentos in iste extrememente active campo.

Le spectroscopia microundic ha multe aspectos, le importantia relative del quales varia con le interesses del individuo. Illo tocca multe problemas fundamental del physica molecular e nucleari. Al chimista structural, illo offere un medio de studiar le plus simple moleculas que frequentemente superpassa omne altere methodos in potentia e versatilitate. Illo es connectite con tal grandemente separate subjectos significative como le spectroscopia quadrupolic nucleari e le spectroscopia de resonantia paramagnetic. Su disveloppamento es distinguite non solo per su rapiditate, sed etiam per le varietate del problemas super le quales illo ha date informationes. Durante que le plus grande parte de su applicationes nunc ha essite essayate a alicun grado, un fluxo non diminuite de investigationes del typos summarisate in iste revista debe esser expectate in le futuro immediate.

COLLOQUIO ASTROPHYSIC

LE 7me COLLOQUIO international astrophysic de Liége va convenir le 12, 13, e 14 de julio 1956. Le thema del colloquio es Le Moleculas in le Stellas. Dr. H. C. Urey presidera. Discutite essera: moleculas in le systema solar; theoria e observationes in re moleculas in le stellas; recente resultatos laboratorial super moleculas de interesse astronomic; e atmospheras molecular e le possibilitate de vita in le universo. (P. SWINGS, Instituto de Astrophysica, Univ. Liége, Cointe-Sclessin, Belgica.)

Julio 7-11. Convention de Spectroscopistas Molecular Europee, Oxford, Anglaterra. Spectroscopia ultraviolette absorptionic, Raman e infrarubie includente nove disveloppamentos in tecnicas, spectros vibrational de moleculas complexe, mesurationes con alte resolution, spectros de flammas, campos de fortia, spectros de crystallos, e le infrarubie remote. (H. W. Thompson, St. John's College, Oxford, Anglaterra.)

Julio 18-29. Programma intensive de spectroscopia infrarubie. (R. C. Lord, Laboratorio de Spectroscopia, Instituto Technologic de Massachusetts, Cambridge Massachusetts, Statos Unite.)

Augusto 29 - Septembre 2. 6te Instituto Annual de Spectroscopia Infrarubie al Universitate Fisk. Designate pro introducer al chimistas, biologistas, physicos, e ingenieros le utilitate del spectroscopia infrarubie in le recerca industrial e academic, tanto como in le insaniamento. (N. Fuson, Universitate Fisk, Nashville, Tenn., Statos Unite.)

Septembre 14-16. 2nde symposio Ottawa super spectroscopia applicate. (J. K. Hurwitz, Branca de Minas, 568 Booth St. Ottawa, Ontario, Canada.)

Autumno. 6te Colloquio International de Spectroscopia Applicate, in Hollanda. (C. J. Bakker, Secretario, Commission Juncte de Spectroscopia, Laboratorio Zeeman, Muidergracht 4, Amsterdam C. Hollanda.)

Junio 1956. Convention del Commission Juncte pro Spectroscopia. Columbus, Ohio o Washington, D. C., S.U. (W. F. Meggers, Bureau National de Standards, Washington 25, D. C., Statos Unite.)

Julio 12-14, 1956. 7me Colloquio International de Astrophysica. Moleculas in le Stellas. Liége, Belgica. (P. Swings, Instituto de Astrophysica, Univ. Liége, Cointe-Sclessin, Belgica.)

STATISTICA VITAL

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RECIPITE usque nunc..... $1.22

SPECTROSCOPIA MOLECULAR es redigite e publicate mensualmente in Interlingua per Prof. Forrest F. Cleveland, Laboratorio de Spectroscopia, Instituto Technologic de Illinois, Chicago 16, Illinois, Statos Unite. Manuscriptos pro publication debe esser submittite illac.

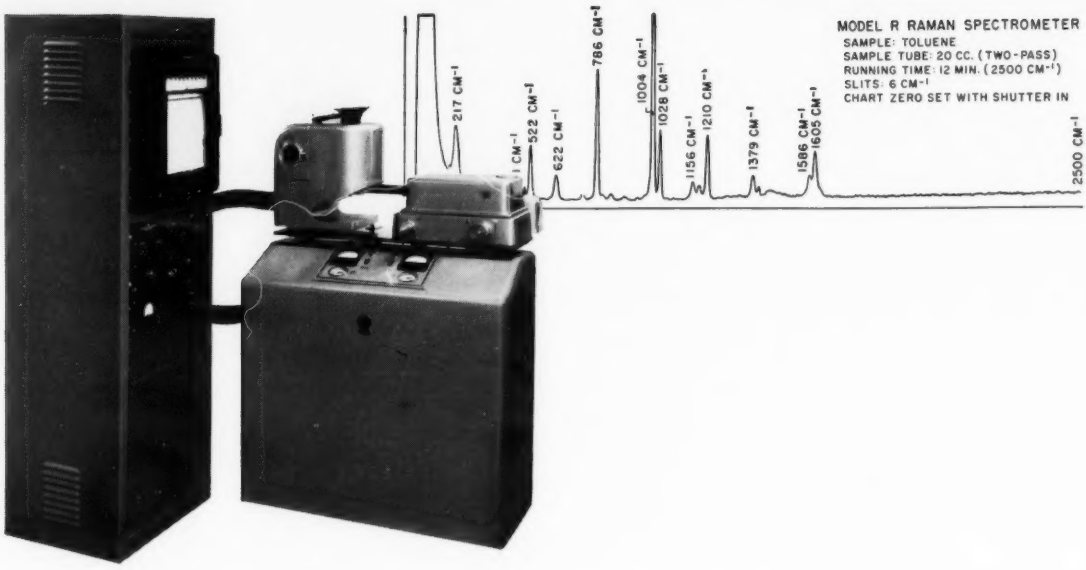
Le texto original es legite per Dr. Alexander Gode, Chef del Division de Interlingua de Science Service (80 East 11th St., New York 3, N.Y.) Libros importante super Interlingua, disponibile ab ille adresse, es Interlingua-English Dictionary, Interlingua Grammar, e Interlingua A Prime Vista.

Labor editorial es gratis. Le costo de preparation e distribution es recipite ab spectroscopistas, bibliothecas, e companias. Assistentes de publication es Srta. Ruth Grining e Sr. Jerome M. Dowling. Le imprimer es facite per le Servicios de Bureau al IT de Ill. sub le direction de Srta. Virginia Brown.

DISPONIBILE

1. Spectroscopia Molecular, 12 numeros per anno, $2.00 nette, franc de posta.
2. Volumines passate de Spec. Mol. pro le annos 1952, 1953, e 1954; $3.00 nette per cata un, franc de posta.
3. Numeros individual, $0.25 per cata un.
4. Monographias super Spectros Molecular. I. Regulas de Selection pro Spectros Vibrational de Moleculas Polyatomic, Forrest F. Cleveland, 1953. 25 paginas, $0.75 nette.
5. II. Tractamentos del Coordinatas Normal de Moleculas Polyatomic, Salvador M. Ferigle e Alfons Weber, 1955. 30 paginas, $1.00 nette.
6. Companias pote attachar un pagina de informationes in re lor productos al sequente numero, si illos es de interesse a spectroscopistas molecular.
7. Spectroscopistas pote requestar le addition de lor nomines al lista de membros del Societate del Spectroscopistas Molecular. Il ha nulle quotas, sed parve contributiones pote esser facite pro expensas necessari.

(Per favor, face cheques pagabile a Spectroscopia Molecular.)



A NEW RECORDING RAMAN SPECTROMETER

High Performance... Simplicity of Operation... Moderate Cost

The Perkin-Elmer Model R Photoelectric Recording Raman Spectrometer combines the latest improvements in Raman design with proven Perkin-Elmer spectrometer components. Priced well below other Raman spectrometers of similar or even less precise performance, it now enables spectroscopy laboratories to take fullest advantage of the possibilities of Raman analysis.

FEATURES OF THE MODEL R:

1. Toronto-type helical mercury arc excitation source
2. Efficient, coated optical transfer system
3. Diffraction grating of 45,000 lines per inch Littrow-mounted in a Perkin-Elmer Model 83 Monochromator
4. Frequency range: 100–3500 cm^{-1} (approx. max. range: 75–4000 cm^{-1})
5. Resolution: 5 cm^{-1} (survey); 2–3 cm^{-1} (high resolution)
6. Accuracy: 0.5% RMS of Raman peak height
7. Scanning Time: 12 mins. (survey); 50 mins. (high resolution)
8. Sample tubes: 20cc, 4.5cc

RAMAN SPECTROSCOPY is becoming increasingly important as a powerful analytical tool. Raman studies yield fundamental information in quantitative, qualitative and structural investigations, complementing that obtained by other techniques. Raman band intensity is directly proportional to the number of molecules of the component of interest; concentrations may be read directly. Raman spectroscopy makes possible swift and accurate analysis of multi-component mixtures; interference problems are minimized. The complete frequency range from 4000 to 100 cm^{-1} can be recorded under high resolution conditions without changing dispersive elements.

WRITE FOR COMPLETE DETAILS

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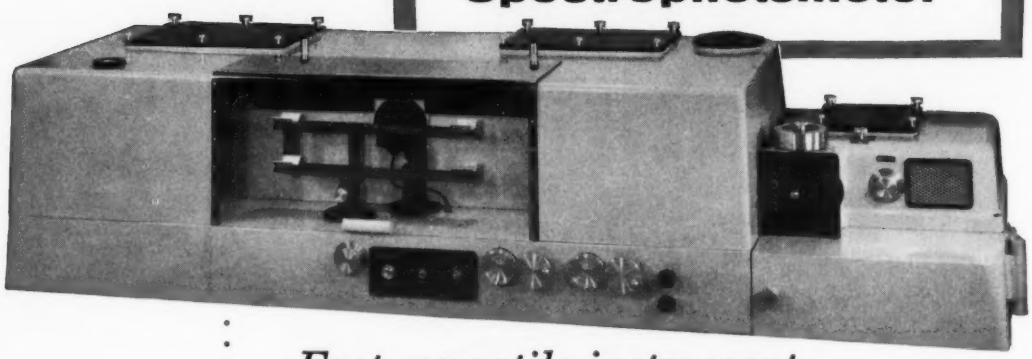
FIRST IN ANALYTICAL CONTROL

Reprinted from THE REVIEW OF SCIENTIFIC INSTRUMENTS, Vol. 26, No. 5, May, 1955

New "double-beam-in-time" **Infra-Red Spectrophotometer**



Fast, versatile instrument records both emission and absorption spectra

From Hilger, builder of the first commercially available infra-red spectrometer, comes a completely new instrument that offers you unmatched speed and flexibility. Use it as a double beam instrument for recording absorption spectra or, by merely turning two knobs, utilize only a single beam and record emission spectra. In either application the instrument offers you unusually high resolving power and maximum reproducibility.

New independently mounted prism table allows quick and precise interchange of prisms including quartz, glass, rocksalt, potassium bromide, calcium fluoride, lithium fluoride and caesium bromide types. Wide choice of fixed and variable path length cells for gasses and liquids. Furnished with either a Cambridge 7" or Brown 11" strip chart recorder in a separate movable cabinet.

For more complete information on this outstanding new Hilger instrument, write today for 20-page illustrated catalog CH 310/2.

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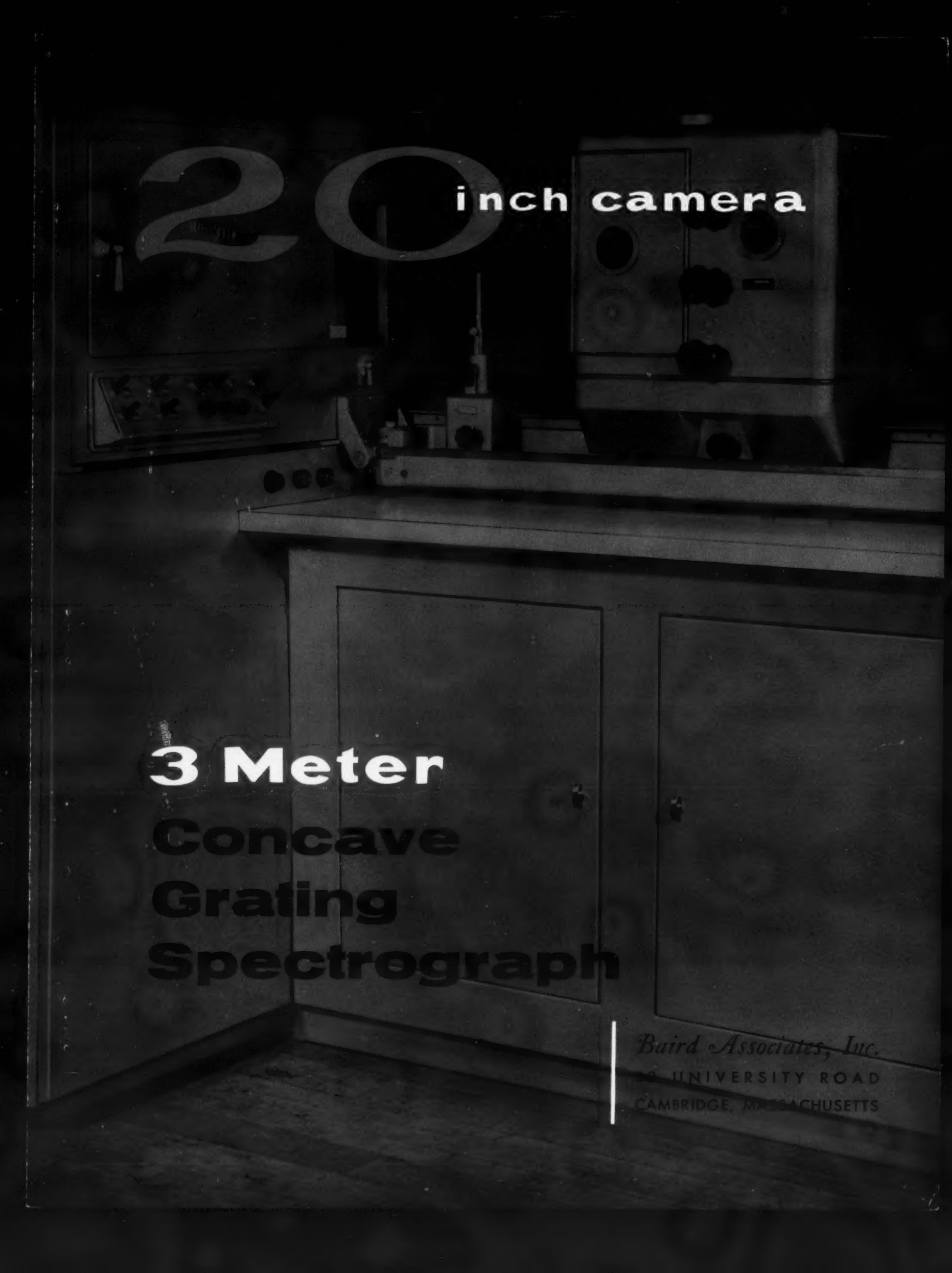

20 inch camera
3 Meter
Concave
Grating
Spectrograph
Baird Associates, Inc.
UNIVERSITY ROAD
CAMBRIDGE, MASSACHUSETTS

The Baird Associates

3 Meter Concave Grating Spectrograph

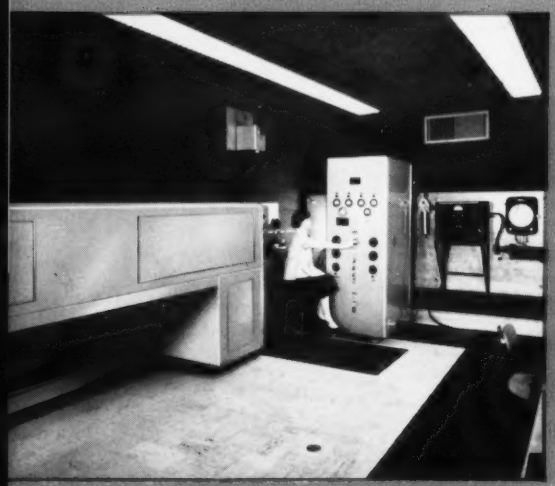
with Modified Eagle Mounting

This well-known and widely accepted instrument, presently used in over 200 research and control laboratories, has been redesigned to provide a 20″ camera. Two 10″ plates, used side by side in the plateholder, insure wavelength coverage in a single exposure of twice that of the previous model instrument. The new instrument can now photograph MORE OF THE SPECTRUM in a single exposure, AT HIGH DISPERSION, THAN ANY OTHER SPECTROGRAPH COMMERCIALLY AVAILABLE.

Flexibility is also increased. This arrangement permits the use of two emulsion types in one exposure.

Spectrochemists who must work with only a limited quantity of sample will certainly appreciate the WIDE COVERAGE PER SINGLE EXPOSURE as well as the very high optical speed provided by this new instrument.

The Eagle type mount permits the use of a concave grating as THE SINGLE OPTIC which ELIMINATES THE NEED FOR AUXILIARY COLLIMATING AND FOCUSING devices which always adversely affect the speed and increase the scattered light level. The Eagle mounting itself is so favorable to the minimization of spherical aberration and coma that no deterioration in resolution results from these effects for the entire range of the spectrograph.



A complete Baird Associates Spectrographic Laboratory insures the best inorganic research and quality control analysis.

Baird Associates Research Department rules uniformly excellent gratings on its engines at the Cambridge plant.

ADVANTAGES . . . *to the user are many and unequaled*

1 SUPERIOR WORKMANSHIP

Analytical results can be no better than the spectrograph which produces them. Users of a Baird Associates spectrograph are assured of high instrument quality, primarily the result of years of manufacturing experience. Baird Associates made its first high dispersion concave grating spectrograph in 1937. Since that time there has been steady progress in manufacturing skill and in the development of testing methods for properly evaluating the performance of the instrument.

2 SUPERIOR OPTICAL DESIGN

The modified Eagle mounting permits the use of a concave grating at even high angles of incidence and of diffraction, thus providing higher orders for increased dispersion and resolution when required. The mounting is particularly advantageous in the minimization of optical aberrations, and resolution is unaffected by these for the entire spectral range of the instrument. Indeed, the ADVANTAGES OF THE EAGLE MOUNTING ARE SO MARKED THAT THE DESIGN OF A SPECTROGRAPH DEPENDENT ON THE USE OF AUXILIARY OPTICAL ELEMENTS CANNOT BE JUSTIFIED. The superiority of the Eagle type mounting is well recorded in the literature. In the Eagle mounting the CONCAVE GRATING CONTINUES TO MAINTAIN ITS POSITION AS THE FINEST INSTRUMENT AVAILABLE FOR THE DISPERSING OF LIGHT INTO ITS COMPONENT WAVELENGTHS.

3 SIMPLICITY IN USE

The operator has only ONE OPTIC TO ALIGN precisely — the grating itself. Maintenance of proper illumination in the busy laboratory by routine operators is exceedingly simple and dependable. The shifting from one wavelength region to another is rapid and precise. Seconds only are required to shift the instrument from Order I to Order VIII, and no respositioning of lenses and source is required.

4 SENSITIVITY FOR EXTREMELY LOW CONCENTRATIONS

The Baird Associates spectrograph has an established reputation for the detection of extremely low concentrations. The elimination of auxiliary, internal optics and the use of carefully engineered systems of light baffling serve to reduce scattered light to the very minimum. In consequence, the instrument exhibits a SUPERIOR "SIGNAL/NOISE" RATIO which is essential to the detection of elements in exceedingly low concentration. Every spectrograph is carefully checked for "signal/noise" ratio prior to shipment.

5 VERSATILITY

The spectrograph may be used for the photography of EITHER STIGMATIC OR ASTIGMATIC SPECTRA. Such devices as step-sectors, step-filters, Hartmann diaphragms, and other external optical devices are available for immediate, effective, and easy use at all wavelength settings. A Fabry-Perot etalon may even be crossed with the spectrograph for specialized problems requiring extreme resolution. The change from one wavelength region to another is easy and precise. The higher orders are readily available. The user is never required to determine new focus settings when changing from one wavelength region to another, from one order to another. The instrument is fully calibrated at the time of installation, and this calibration is continuous and exact for the entire range of the instrument.

SPECIFICATIONS

1. GRATING

Type	Original ruling in aluminum on 4″ pyrex blank.
Radius of Curvature	3 meters.
Grooves/inch	15,000. 7,500 and 30,000 grooves/inch gratings also available in extra holders for rapid interchange.
Total number grating grooves	50,600 (15,000 grooves/inch.)

2. TOTAL AVAILABLE SPECTRUM

Order I	1,800 — 22,750 A
Order II	1,800 — 11,375 A
Order III	1,800 — 7,583 A
Order IV	1,800 — 5,687 A
Order V	1,800 — 4,550 A
Order VI	1,800 — 3,791 A
Order VII	1,800 — 3,250 A
Order VIII	1,800 — 2,843 A
etc.	etc.

3. SPECTRUM COVERAGE PER SINGLE EXPOSURE (15,000 grooves/inch grating)

Typical Examples in One Exposure (20″ camera)

Order I	1870 A — 4710 A	(2840 A)
	This exceeds the entire range of sensitivity of SA#1 emulsion.	
Order II	2405 A — 3805 A	(1400 A)
Order III	2378 A — 3295 A	(917 A)

4. MEAN RECIPROCAL LINEAR DISPERSION (A/mm)

Order I	5.6 A/mm
Order II	2.8 A/mm
Order III	1.8 A/mm
Order IV	1.4 A/mm
etc.	etc.

5. THEORETICAL RESOLVING POWER (15,000 grooves/inch grating)

Order I	50,600
Order II	101,200
Order III	151,800
Order IV	202,400
Order VIII	404,800

6. GUARANTEED RESOLUTION (15,000 grooves/inch grating)

Order II	0.07 A at 3100 A	(44,285)
Higher Orders	0.03 A at 3000 A	(100,000)

Note on achievable resolution: Resolutions in excess of 100,000 have been demonstrated in Order III and in excess of 300,000 in Order VIII. A paper on high resolution spectroscopy using the Baird Associates Spectrograph is available on request.

7. FEATURES

Plate Racking	Electric, automatic. Control from spectrograph panel and source exposure timer as desired. Moving plate studies provided for.
Shutter	Electromagnetic. Control from spectrograph panel or source timers.
Slits	Fixed, interchangeable.
Grating Mask	None.
Vertical Grating Aperture	Adjustable to reduce exposure level if desired.
Grating Holder	Rapidly interchangeable with holders containing gratings of different groove spacings.
Camera	20″ for one or two 10″ plates. Film adapter available.
Spectrum Height Control	Adjustable apertures at plate or at Sirks' Focus.
Optical Bar	Extremely rigid, calibrated.
Arc-Spark Stand	Enclosed. Pin and Petrey holders interchangeable. Safety interlock.
Controls	Completely electric control panel on front of spectrograph.
Storage Space	As desired. A wide selection of cabinets available for insertion beneath spectrograph. Detailed information available on request.

Baird Associates Inc.

33 UNIVERSITY RD.
CAMBRIDGE, MASS.

BULLETIN 52

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